Refraction Review then Optics Intro

eg. In the lab, you shined light through water at various angles.

Given $n_{water} = 1.33$ and $n_{air} = 1.0003$

$n=c/v$ $n_i\sin\theta_i=n_r\sin\theta_r$ $\theta_c=\sin^{-1}(n_r/n_i)$

a) If the light is incident at 33.2º on water, what angle does it go through the water? Draw the ray.

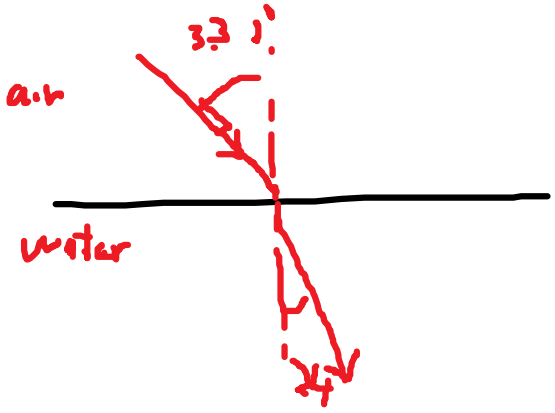
$n_i\sin\theta_i=n_r\sin\theta_r$

$\theta_r = \text{Sin}^{-1}(n_i\sin\theta_i / n_r) =$

Asin(1.0003xSin(33.2)/1.33)=

24.31954157734334

24.3º



b) If the light is incident from water on air at 33.2º, what angle does it go out into

the air? Draw the ray.

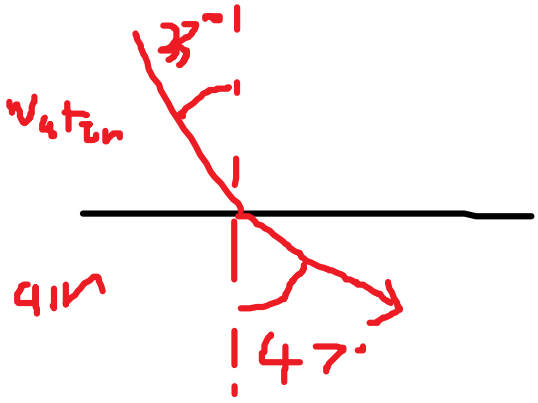
$n_i \sin\theta_i = n_r \sin\theta_r$

$\theta_r = \text{Sin}^{-1}(n_i \sin\theta_i / n_r) =$

Asin(1.33xSin(33.2)/1.0003)=

46.7223874425035 1

46.7º



c) what is the critical angle between water and air?

$n_i \sin\theta_i = n_r \sin\theta_r$

$\theta_r = \text{Sin}^{-1}(n_r \sin\theta_r / n_i)$ or $\theta_c = \sin^{-1}(n_r/n_i)$

Asin(1.0003xSin(90)/1.33)=

48.7730728442077 1

48.8º for the critical angle

d) what is the speed of light in water?

n=c/v so v=c/n = 3.00E8/1.33=2.2556E8

n=c/v so v=c/n = 3.00E8/1.33=2.2556E8

2.26×10^8 m/s

p355-361Q5-8,CR1.1-1.4, CR2.1-2.4
p365 Q23 block is 3.5 cm by 6.0cm and light enters at the middle of the smaller side.
Go over CR before the quiz

Intro to Optics Activity
Not a lab - don't hand in

1. Pinhole camera - get a tall lamp and measure the size of the filament (glowing part) - h_o height of the object - Measure the distance from the filament to the pinhole - d_o the distance from the object to the optical device.
   - put a screen (piece of paper) on the other side of the pinhole. Measure the distance between the pinhole and the screen, d_i - image distance.
   - measure the size of the image of the

filament on the screen, h_i.

- observe the changes in h_i when you alter h_o, d_o and d_i. (alter h_o by covering the lamp with your hand)

h_o	d_o	d_i	h_i
(cm)	(cm)	(cm)	(cm)

leave space for 9 measurements

3 different h_{os} with the same d_o	d_i

3 different d_{os} with the same h_o and d_i

3 different d_{is} with the same h_o and d_o

derive an equation relating variables

2. Look in a flat mirror (plane mirror). Think about the smallest mirror that will show your whole body.
3. Look in the curved mirrors in the back window and describe what you see.

draw ray diagrams for each part